July 30, 2004

City of Long Beach
Department of Public Works
333 West Ocean Boulevard, 9th Floor
Long Beach, CA 90802

Attn: Mr. Tom Leary, Stormwater Program Officer

Subject: Deliverable for Task 6, Water Quantity Assessment, – Basin Hydrograph – Colorado Lagoon Restoration Feasibility Study

Dear Mr. Leary:

This letter report provides the "Basin Hydrograph" deliverable for the Colorado Lagoon Restoration Feasibility Study. This deliverable is part of Task 6 (Water Quantity Assessment).

Introduction

It is understood that flood control within the vicinity of the Colorado Lagoon is a concern. (This is in part due to the flooding which occurred in the area during a high intensity storm in 1995). A basin hydrograph provides a tool to be used with our hydrology/hydraulics model in order to assess the potential for flooding in the areas surrounding the lagoon.

The County of Los Angeles Public Works Department has developed three different basin hydrographs of the Colorado Lagoon for the County's Termino Avenue Drain Project (TADP), (reference 1): 1) existing conditions, (i.e. existing storm drain outfalls into the lagoon and existing watershed area), 2) existing conditions plus addition of a new storm drain outfall into the lagoon for the TADP, and 3) diversion of part of the watershed area storm flows away from the Colorado Lagoon. We have assessed the County's hydrographs and have determined that these are acceptable for use on our project.

Basis of Hydrologic Analysis

The County's hydrologic analysis was based on:

- A 50-year frequency storm event; this is consistent with the County's Hydraulic Design Manual (reference 2), which states that "for drains …. which will serve as outlets for sump areas, a storm frequency of 50 years shall apply. A sump is defined as a low area which prevents the free passage of water with consequent flooding of streets or private property." The 50-year frequency storm is a statistical model to predict storm water drainage conditions.

- A watershed area of 1130 acres for the storm flow outfalls into the Colorado Lagoon, per watershed boundary maps developed by the County's Public Works Department. The City of Long Beach Stormwater Management Plan, (reference 3), defines the Colorado Lagoon as one of five major storm water storage basins in the City of Long Beach and as part of the Basin 21 watershed. Basin 21 is defined to be 1172 acres total and it should be noted that a portion of this watershed outfalls into the Marine Stadium as well. The difference in watershed area size (42 acres) can be attributed to the additional area that outfalls into the Marine Stadium.

Basin Hydrograph – Existing Condition

Figure 1 is the basin hydrograph for Colorado Lagoon for a 50-year frequency design storm, for existing conditions. The peak flow rate from the watershed entering the lagoon is 710 cfs with a runoff volume of 265.2 acre-feet.

Termino Avenue Drain Project Assessment

It will be necessary to assess Colorado Lagoon study alternatives with and without the inclusion of the County's Termino Avenue drain outfall into the lagoon. We have obtained the County's hydrograph for Colorado Lagoon for a 50-year frequency design storm, with the new drain outfall into the lagoon, (Figure 2). Based on our understanding of the County's memo, the peak flow rate from the watershed entering the lagoon for this alternative would be 971 cfs with a runoff volume of 164.4 acre-feet; the runoff volume is less than the existing condition hydrograph because the alternative includes a 45 cfs low flow diversion away from the lagoon.

Opportunities to Minimize Flood Risk

We have identified a preliminary list of opportunities to decrease and spread out the peak storm flows reaching Colorado Lagoon. These include:

- The County's TADP alternative that diverts a portion of the watershed area storm waters away from the Colorado Lagoon (and directly into the Marine Stadium). This alternative also includes a diversion of low flows ($\leq$ 45 cfs) away from the lagoon and into a treatment plant. Based on our understanding of the County's memo, the resulting hydrograph is shown in Figure 3 and shows a peak flow entering the lagoon of 614 cfs and a runoff volume of 89.1 acre-ft. This is a significant reduction of water quantity entering the lagoon - 96 cfs (14%) less than the existing condition peak flow and 176 acre-ft (66%) less than the existing condition total runoff volume.
- Other opportunities to decrease water quantity (and improve water quality) into the lagoon include vegetated swales along the golf course/ lagoon boundary and vegetated swales along the greenbelt (old Pacific Electric Right-of-Way).

These opportunities will be addressed further in the "Opportunities and Constraints Report" deliverable.

Summary

The attached hydrographs, developed by the County of Los Angeles, will be used as the basis of the Colorado Lagoon Restoration Feasibility Study hydrologic/hydraulics analysis. The flooding potential is addressed in the hydrologic/hydraulics report deliverable.

Thank you for the opportunity to work on this important project. Please contact Kim Garvey or me at 562-426-9551 with any questions or comments.

Sincerely,

MOFFATT & NICHOL

Chris Webb
Project Manager

References:

1) Memorandum, "Termino Avenue Drain (Project No. 5152) – Hydrology Phase 2", Reza Izadi, Water Resources Division, County of Los Angeles, March 3, 2003.
2) "Design Manual - Hydraulic", Los Angeles County Flood Control District, March 1982.
3) "Stormwater Management Plan", City of Long Beach, August-2001.
4) "Storm Drain Master Plan and Management Program", City of Long Beach, Hydrology/Hydraulics Summary Table - June 14, 1991.

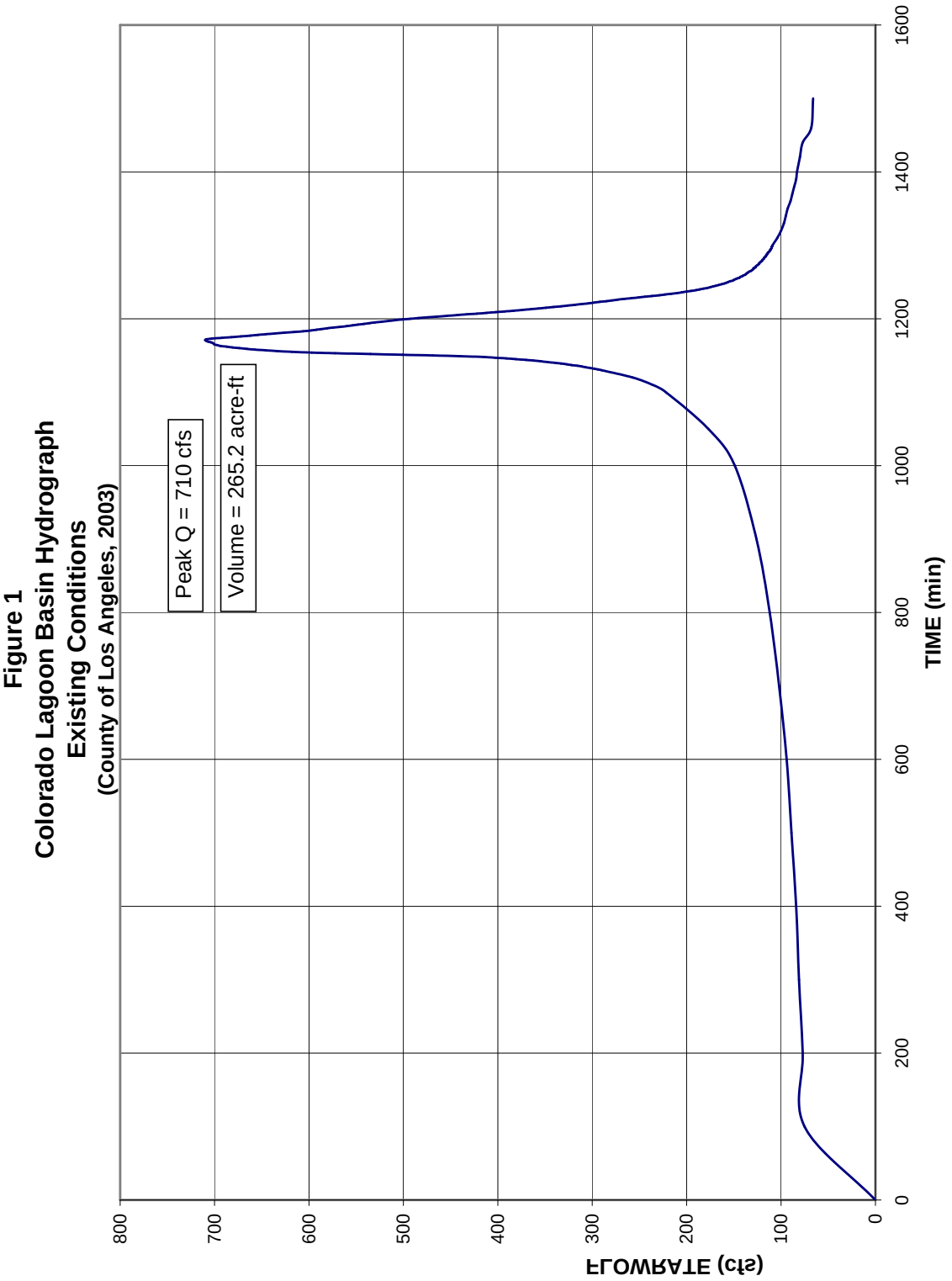
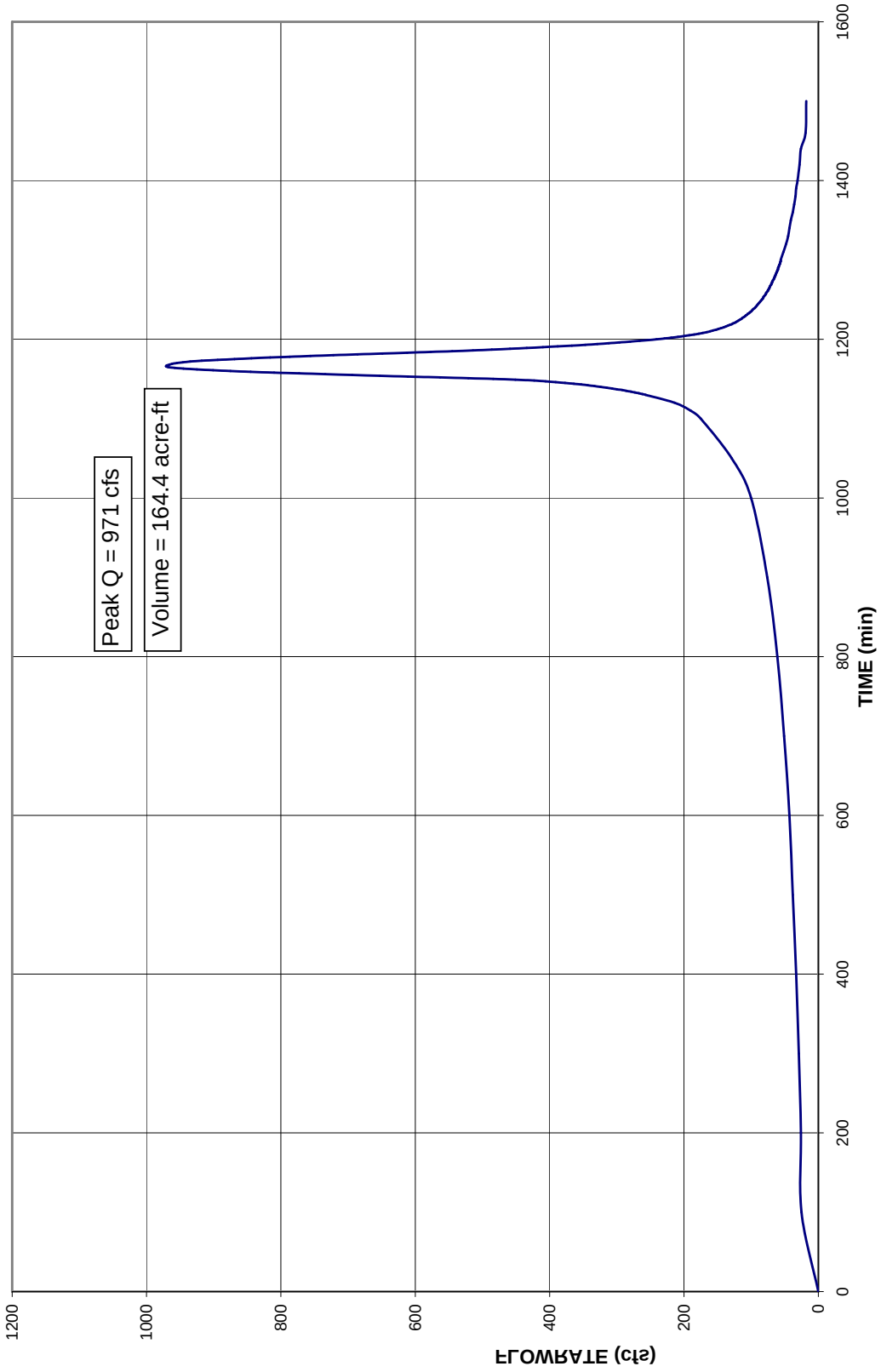


Figure 1
Colorado Lagoon Basin Hydrograph
Existing Conditions
(County of Los Angeles, 2003)

Figure 2
Colorado Lagoon Basin Hydrograph,
TADP Alternative - New Termino Avenue Drain Outfall into Colorado Lagoon and Low Flows Diversion (County of Los Angeles, 2003)



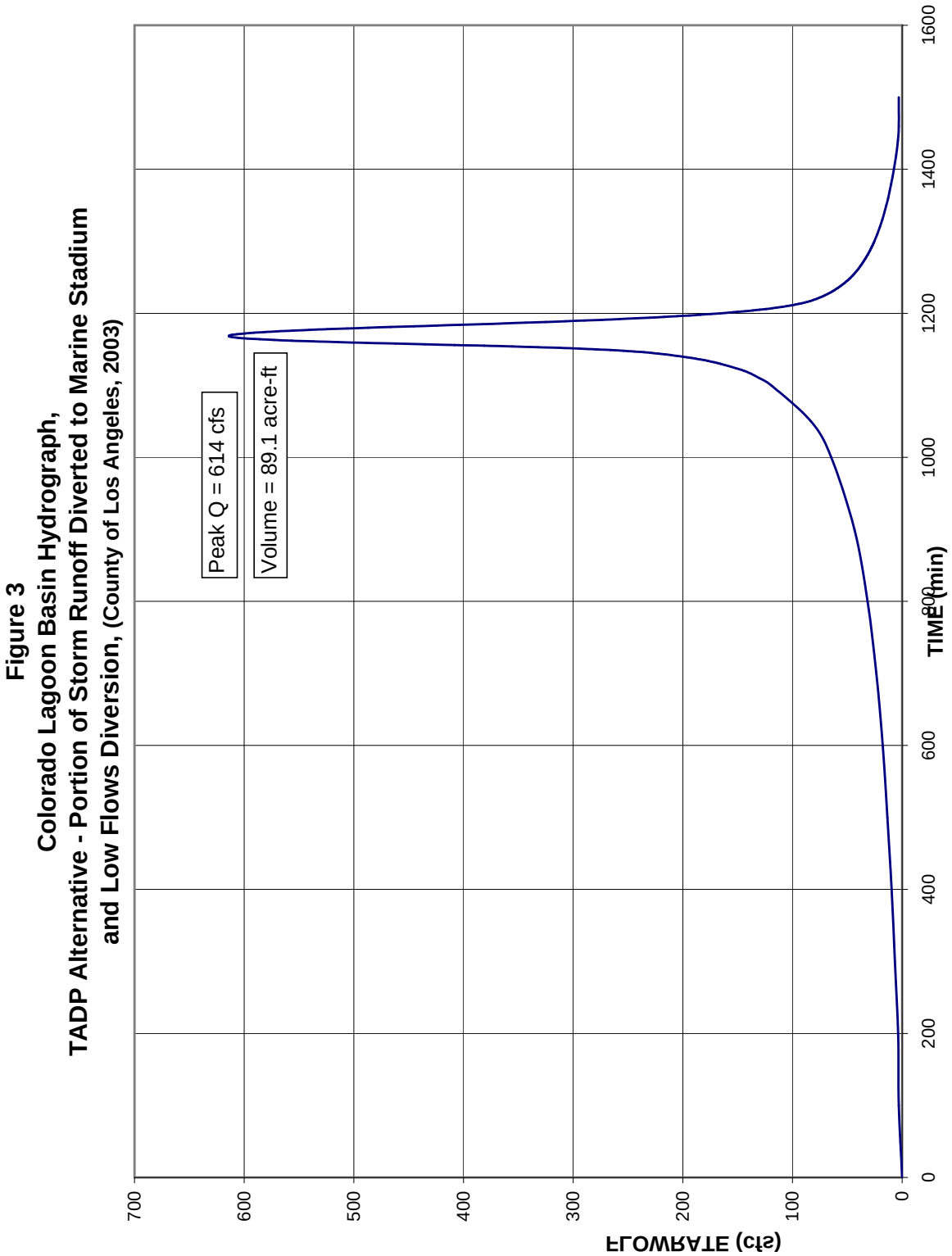


Figure 3
Colorado Lagoon Basin Hydrograph,
TADP Alternative - Portion of Storm Runoff Diverted to Marine Stadium and Low Flows Diversion, (County of Los Angeles, 2003)